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UNCLASSIFIED- INFORMATION ON SOVIET BLOC INTERNATIONAL GEOPHYSICAL COOPERATION -1959

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INTERNATIONAL GEOPHYSICAL COOPERATION PROGRAM -- SOVIET-BLOC ACTIVITIES

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I. GENERAL

Pecny Geodetic Observatory Described

The surveying service in Czechoslovakia today employs thousands of workers. The institutes of the Central Administration of Geodesy and Cartography (Ustredni sprava geodezie a kartografie) did not have adequate buildings and equipment until recently. There had been no permanent center for laboratory work and instrument testing. International cooperation in solving various problems in astronomy and gravimetry provided the stimulus for establishing a permanent geodetic work center. One such problem was to determine the exact difference in longitude between some of the basic triangulation points and key points of neighboring countries.

Of the three triangulation points considered for the center, namely, Brdo, Ladvi, and Pecny, the Pecny point at an altitude of 546 meters was selected as the one best fulfilling conditions for the construction of a permanent geodetic observatory. The point is about 35 kilometers southeast of the center of Prague. A bus line through Ondrejov, which is about a 20-minute walk from Pecny peak, provides communication with Prague at about 2-hour intervals during the day. The astronomical observatory of the Institute of Astronomy of the Czechoslovak Academy of Sciences at Zelov is about 650 meters southwest of the Pecny site, on a hill 526 meters high.

The initial views of individual specialists on the size of a permanent geodetic field station were gradually clarified by consultation, and the building program was expanded and supplemented from 1955 to 1957, until it became as described below.

The area of the fenced-in plot is about 4.14 hectares. The top of the hill is covered with tall coniferous and deciduous trees, while the lower part has a younger and more sparse deciduous growth with some tall pines. The plot is divided into two parts. In the upper part, there is a brick measuring tower, built in 1936, containing a central geodetic point, three observation sheds where valuable instruments will be installed, a shed for recording instruments, and an auxiliary office. Plans for the lower part, or administrative area, include a two-story main building, two brick huts for temporary quarters, a well, a garage for two motor vehicles, and a septic tank. Approach roads will be built in from the west. The basement of the building contains a pendulum vault, laboratory space, a photography room, and a machine and carpentry shop. The ground floor contains the manager's apartment, several small rooms, and the employee's work area. The second floor contains a room for the observatory director, a kitchen, and some small rooms and work areas.

The Peeny trigonometric point is part of a first-order triangulation net made by the former Austrian Military Geographical Institute and was also selected as a point of the basic Czechoslovak trigonometric net with base lines to Sadska, Vysoka, Melechov, Mezi Vraty, Studeny Vrch, and Ladvi. A survey of these points was made during the 19th Century in a first order triangulation. A tall, concrete pillar stands on the Sadska trigonometric point. Brick towers were built on other points of the basic trigonometric net, and base lines were run to Peeny by 1943. These were built on a somewhat different plan than the Peeny tower, and the imperfections of the Peeny tower were corrected in them. A total of 42 base lines were run to the Peeny trigonometric point. In 1937 and 1938, measurements of latitude, longitude, and azimuth were made at the Ladvi trigonometric point, and so the Peeny trigonometric point is also a Laplace point. The first astronomical measurements of latitude and azimuth at the Vysoka trigonometric point were made in 1889. In that year, Sterneck measured gravity at 980.938 gals, using a pendulum in the Vienna system and 980.922 gals in the Potsdam system. According to present measurements, this value is 980.945 gals, exact to one milligal.

Geographical coordinates, which were determined astronomically and officially announced to the IGY international center, are

49 degrees, 54 minutes, 56.1 seconds North

14 degrees, 47 minutes, 21.12 seconds East

- 59 minutes, 09.41 seconds.

The long-range program for the Peeny Geodetic Observatory was evaluated at the 25 September 1957 session of the Geodetic-Topographic Section of the Scientific and Technical Council of the Central Administration of Geodesy and Cartography. The session was attended by Boehm; Broz, corresponding Member of the Czechoslovak Academy of Sciences; Buchar; Kouba; Academician Rysavy; and Wittinger. In view of the mission of the center and the international significance, the section recommended the official name of "Peeny Geodetic Observatory" (Geodeticka observator Peeny). It agreed with the proposal that the Peeny point be the point of reference of four types of coordinates:

1. Geographical

2. Plane

3. Elevation

4. Gravity.

Long-range plans call for this station to conduct chiefly the following activities:

A. Geodetic Astronomy

1. International geodetic-astronomical measurements for determining differences in longitude.

2. Measurement of longitude and latitude under the IGY. (At pre the third measurement of longitudes is under way; the second measurement was made in 1933 at Ondrejov observatory, and subsequent measurements will be tied into the Pecny point.)

3. Cooperation with the time service of the Czechoslovak Academy of Sciences in time measurements.

4. Determination of changes in reference astronomical-geodetic values (latitude service).

5. Measurement of absolute longitudinal differences in determining geographical coordinates for other points in Czechoslovak territory.

On points 3 and 4, the section recommended close cooperation with the Institute of Astronomy of the Czechoslovak Academy of Sciences.

B. Gravimetry

1. Pendulum measurement.

2. Test measurement of swells in the earth's crust, while correcting the nationwide gravimetric measurements.

3. Testing gravimetric and pendulum instruments.

C. Triangulation and Polygonometry

1. Tests in the direct measurement of longitudes with newly designed electro-optical range finders.

2. Research in the area of measurement of base lines and longitude lines.

3. Research in the stability of pillars and marks.

D. Altitude measurements

1. Tests of methods for observing vertical deformation and settling of geodetic marks.

2. Research on the influences of vertical refraction and other systematic errors on altitude measurement.

E. Geodetic instruments

1. Tests of apparatus used in field work.

2. Repairs and maintenance of instruments.

F. Test polygon (stabilized)

G. Training center for workers in geodetic service and students of advanced and industrial schools.

The section recommended a suitable adaptation of the brick tower for greater stability and construction of a constant-temperature vault under the main building of the observatory.

Construction of the Pecny Geodetic Observatory was planned so that, in the first half of 1957, some equipment could be used for astronomical measurements under the IGY. Because of unforeseen circumstances and difficulties, the building program could not be followed; therefore, to carry out IGY agreements, emergency equipment, which will continue to be used for some time, was built on Pecny peak chiefly in 1957.

Measurements in the IGY, 1957-1958, and measurements for determining longitudinal differences of state central points in Pecny, Czechoslovakia, to Potsdam, the German Democratic Republic, in 1955 and 1957; Pecny to Borowa Gora, Poland, in 1957; and Pecny to Budapest, Hungary, in 1958 (for the IGY) were completed with temporary facilities.

Modification of the observation area is not included in the building program because of financial limitations. It will be done gradually after completion of the structures.

Also being considered is the construction of eccentric stands for gravity meters in the brick tower and in the main building, an observation shed for a zenith telescope, a brick cellar for batteries, sighting marks in the brick walls, suitable antennas, and markings of the astronomical azimuth.

According to present estimates, construction will be completed in 1960 at the earliest. Further modifications of the buildings and terrain, equipment, and machinery will take several years yet.

(The article also contains a small map section captioned "Topographical sketch of the vicinity of the Pecny Geodetic Observatory," a sketch of the cross section of the Pecny point according to the 1936 project, and photographs of the tower, temporary equipment, and points in the plot.) ("Construction of a Geodetic Observatory at Pecny," by M. Wittinger, GTU [not explained]; Prague, Geodeticky a Kartograficky Obzor, No 7, Jul 59, pp 121-124)

II. ROCKETS AND ARTIFICIAL EARTH SATELLITES

"Exclusive" Report by Shternfeld' to East Berlin Weekly

The full text of this report is as follows:

"The cosmic research program is unfolding at a fabulous tempo. Scarcely had the Moon circled the Earth once, following the astounding arrival of the visitor from our planet, the second Soviet cosmic rocket, when the next ambassador from the Earth, the automatic interplanetary station, hurried by in the immediate vicinity of the Moon.

"Many paths connect the Earth and Moon. The most suitable and most advantageous must be chosen from among them. Of decisive importance are the fuel consumption, which is related to the total weight of the rocket, and the duration of flight, which depends on the velocity of the rocket.

"In the main, two orbits were suggested for the flight around the Moon. The first suggestion was that the rocket be launched in the direction of the orbit of the Moon, fly around the Moon, and return to the Earth in a symmetrical curve. The second suggestion was that the rocket fly around the Earth and the Moon, describing a somewhat distorted elliptical orbit.

"Which of the two suggested orbits is to be preferred?

"Let us assume that a rocket is provided with a propulsion system capable of imparting to the rocket, without any losses, an acceleration of 40 meters per second. Actually, however, the force of attraction of the

Earth would lower this velocity of a vertically launched rocket by about 10 meters per second. This means, therefore, that the acceleration would be about 30 meters per second. Accordingly, the velocity loss would be 25 percent.

"According to the second suggestion, the rocket would move into an elliptical orbit inclined at a certain angle to the surface of our planet. When the rocket has reached the furthermost point of this orbit, it will fly for a time almost parallel to the surface of the Earth, while being imparted a greater horizontal velocity. In this case, the velocity loss caused by the attraction of the Earth would amount to only 3.5 percent. The second suggestion thus appears to be more favorable than the first, and this is not only because of the lower velocity loss during the takeoff. There are also certain advantages for the return flight to Earth. If the rocket on its return flight enters the Earth's atmosphere at a great angle to the horizon, the rapid deceleration in the dense layers of the atmosphere can cause a destructive overload on the rocket or a violet collision at the Earth's surface. The nullification of the velocity of the vehicle within the atmosphere must, therefore, take place over the longest possible route. The direction of descent must, therefore, be almost horizontal. This requirement is satisfied by the second suggestion. The rocket is moving almost parallel to the Earth's surface when it plunges into the atmosphere. Under these conditions, it can descend in a glide, taking a rather long period of time, gradually decrease its velocity, and finally set itself down on the Earth.

"The use of the thrust of a rocket for braking, i.e., the use of a jet of gas expelled in the direction of motion of the landing vehicle, comes into consideration only when it is impossible to use the atmosphere for this purpose.

"The second suggestion was chosen for the third cosmic rocket, even though no provision is made for the return of the rocket directly to the earth. The orbit of Sputnik IV (Lunik III) between the Earth and Moon was subject to very great changes, chiefly as a result of the interaction of the gravity of our planet and of its natural satellite. However, from the moment the automatic space station moved away from the Moon, the Moon itself had practically no further influence on the orbit, which now had an elliptical form.

"The Soviet scientists gave the first cosmic rocket a velocity of about 11.4 kilometers per second, and to the second cosmic rocket, a velocity of 11.3 kilometers per second. The third cosmic rocket, however, was given a velocity of 11.1 kilometers per second, which is 100 meters per second less than the velocity of the second cosmic rocket (11.2 kilometers per second). Why?

on an orbit which passes only a few thousand kilometers from the surface of the Moon. Such an orbit, however, has the disadvantage that the station approaches the Moon only one in 2 months, while approaching the Earth five times in the same period.

"There is still another difficulty. The orbit of such artificial celestial bodies could assume the form of an exact ellipse only if such an orbit, in the course of time, approaches the immediate vicinity of the moon. As soon as the space station gets into the realm of lunar gravity, that segment of its orbit, the apogee, on which the velocity otherwise decreases is accelerated because of the attractive force of the moon. After passage through the apogee, when the space station again moves toward the Earth, the field of gravity of the Moon retards its motion, and not until it is a great distance from the moon does the attraction of the Earth become noticeable and again accelerate the motion of the rocket. It is understandable that this would produce a considerable distortion of the orbital ellipse.

"The motion of the artificial celestial body is also influenced, however, by the ellipticity of the Earth and other factors, which cause the perigee and apogee of the orbit to shift and change the position of the plane of the orbit in space. Thus, it can happen that the space station, which for many months has been flying past the Moon at a great distance from the Moon, will finally collide with the Moon. For this reason, the orbit must continuously be corrected by means of a small rocket engine (which is only one hundredth the size of a modern jet aircraft.)

"Let it be said that the use of an interplanetary station, which would move on a circular orbit at great altitude (thousands of kilometers) as suggested by various scientists, is extremely disadvantageous. We believe that much fuel can be saved if an interplanetary station is used which moves on an elliptical orbit with the smallest possible perigee around the earth (in the manner of the automatic interplanetary station).

"One variation of the automatic interplanetary station is possible, in which rockets, which are supposed to go to more distant celestial bodies, are fueled automatically without participation by any humans on board.

"Before man lands on the Moon, he will probably, like the automatic stations, first fly around the Moon. On the basis of those data which are collected as a result of the investigation of the lunar surface by means of automatically guided rockets and artificial satellites of the moon, the crew of the lunar ship will engage in complex research work.

"It would have been entirely possible to have imparted a higher velocity to the rocket. The thus reduced flight time would, without a doubt, be an advantage. In the given case, however, the different orbit would have been disadvantageous, since a greater velocity of the rocket in the region of the Moon would bring it far from its target and, perhaps, make it impossible for it ever again to return to Earth. There are other additional difficulties, which will not be discussed here.

"In the case of a lower velocity, for example, 11.1 kilometers per second, all of these difficulties are avoided to a considerable degree. If a rocket is launched in the direction of the Moon, it has -- provided it enters the effective area of the Moon -- the tendency to fly around the Moon, even without the influence of orbit-correcting instruments.

"The (in comparison with the first two cosmic rockets) lower velocity of the third cosmic rocket was, therefore, necessary, if the rocket was to fly around the Moon on the orbit specified for it.

"As experiences with the third Soviet cosmic rocket have shown, manned Earth satellites can, in principle, be produced in the future.

"Even so-called 'transit space stations' would be conceivable. They could cruise along regular routes in the universe. The route of such a station would be along an extended elliptical path, on which it would periodically come into the vicinity of the Earth. These artificial celestial bodies could be used as 'jumping-off stations,' for example, for flights from our planet to the Moon. A smaller 'delivery rocket' could be used to permit personnel to get to the station, board it, and travel along with it. In the vicinity of the Moon, a smaller rocket could again be used to get to the Moon. The orbit of such a smaller 'delivery rocket' could also be computed so that the rocket would fly around the far side of the Moon. The researchers would then be able to observe at close hand the half of the moon which is hidden from us.

"For such a transit space station, one might also choose an orbit on which the station could pass the Moon 13 times (sometimes even 14 times) per year, and every 2 weeks there would be a possibility for space travelers to return from their space station to Earth.

"At the same intervals of time, the station could be supplied from Earth with food, drinking water, medicines, etc.

"A station with an extended elliptical orbit, however, has one disadvantage. It moves too far away from the Moon and flies past the Moon with too great a velocity. Thus, a station would be preferable which moves

"For what reason is such a number of cosmic research projects purposeful? The second cosmic rocket already has taken a container with measuring instruments to the surface of the Moon. When, then, should we first fly around the Moon with rockets, instead of storming the Moon directly? Why should the space researchers not fly directly to the Moon?

"Let us consider this problem from the viewpoint of power engineering. In the case of a flight to the Moon, it is simpler to go from the Earth to the Moon and back without any landings in between. A rocket which is supposed to land on the surface of the Moon and then lift itself from the Moon's surface in order to return to the Earth needs more fuel than it would if it merely flew around the Moon and returned to the Earth. For a safe landing on the Moon and a subsequent takeoff for return to the Earth, great amounts of fuel would be required. For this reason, the above-mentioned series of moon flights seems to be the most suitable program. Even flying around the Moon with a subsequent transformation of the rocket into a temporary lunar satellite and then returning to Earth requires less powerful rockets with smaller amounts of fuel than a landing on the Moon and a return takeoff to the Earth." ("Paths to the Moon," by A. Shternfeld', Moscow; Berlin, Neues Deutschland, 17 Oct 59, p 9)

III. UPPER ATMOSPHERE

New Volcanic Activity on Moon Reported by Kozyrev

Prof Nikolay A. Kozyrev, Doctor of Physicomathematical Sciences, of the Main Astronomical Observatory of the Academy of Sciences USSR, Pulkovo, reports new evidence of volcanic activity on the Moon.

Prof Kozyrev is now at the Crimean Astrophysical Observatory, where he is continuing his observations of the lunar surface by spectral methods. This work has been successful, according to Prof Kozyrev. He reports that on 23 October, while using the 50-inch reflector of the Crimean Astrophysical Observatory, he again obtained a spectrogram of the central peak in the crater of Alphonsus. Once again, the spectrum was unusual for the lunar surface. Alphonsus continues to remain an active spot on the Moon, says Prof Kozyrev, which is still another confirmation of the existence there of volcanic activity. ("New Observations of the Crater of Alphonsus"; Moscow, Pravda, 30 Oct 59, p 6)

Far-Side Pictures

The information which the pictures of the Moon's far side are giving is of great interest from a cosmogonic viewpoint since it makes it possible to make a certain selection between existing hypotheses on the origin and development of the Moon. This is important for solving the problems of the origin of the Earth and of the solar system.

Before astronomers, specialists in the field of studying the Moon and the planets, there now stands a great and absorbing task -- the composition of a detailed map of the other side of the Moon. Even the creation of a lunar globe is already a possibility. thinks A. Masevich, Deputy Chairman of the Astronomical Council of the Academy of Sciences USSR. These maps will be of great use, he says, in future interplanetary travel. ("Triumph of the Mind," A. Masevich, deputy chairman of the Astronomical Council, Academy of Sciences USSR; Moscow, Izvestiya, 28 Oct 59, p 12)

Two New Radiotelescopes of the Academy of Sciences USSR

The radioastronomical station of the Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR, is located several hours' drive from Moscow. The area for its installation was selected far from industrial enterprises for the express purpose of avoiding all possible noises while working with the most sensitive instruments.

The future development of radioastronomy requires the creation of larger and larger radiotelescopes. Among these are movable radiotelescopes with antennas in the form of parabolic dishes.

The instrument at the Physics Institute's station, which is now undergoing tests, differs, according to T. Fetisov, special Izvestiya correspondent who visited the installation, from radiotelescopes in other countries in that the latter can receive radiation only in long waves, not shorter than several centimeters. Even the largest of these foreign telescopes, England's instrument at Jodrell Bank, can receive only those from 20 centimeters up.

The radiotelescope at the Physics Institute's station is the first such large instrument in the USSR, says Fetisov. The following information on this telescope was given by D. V. Kovalevskiy, chief of the station.

The work on the creation of the instrument was done in the institute over a period of several years, under the direction of A. Ye. Salomonovich, senior scientific associate, Candidate of Physicomathematical Sciences, and P. D. Kalachev, chief designer of the radiotelescope. The collectives of a number of design organizations and industrial enterprises took part in the development and manufacture of the instrument. The parabolic dish is 22 meters in diameter, and its focal length is 9.5 meters. Weight of the dish is 65 tons. Weight of the entire telescope is 380 tons. Assembly and adjustment has taken 2 years.

The controls and receiving apparatus are located in a shack mounted on the base of the telescope under the dish.

According to Kovalevskiy, the telescope has the greatest resolving power of any movable telescope in the entire world. It can be aimed at any point in the sky. It has a special tracking device. Lengthy observations for cosmic sources of radiation will be aided with this instrument. At present, says Kovalevskiy, radiation of the Sun and Moon are being studied. Several radio images of the Sun have already been obtained.

Another new and interesting instrument at the station is a cross-shaped radiotelescope resembling a long row of high steel supports. It was constructed under the supervision of V. V. Vitkevich, Candidate of Physicomathematical Sciences. This new telescope, it is claimed, will be the largest in the world. Each of its arms is about one kilometer long, and its height, 40 meters. The arm of the antenna is oriented from west to east and can be turned around a horizontal axis. ("The Stellar Worlds Are Closer," by T. Fetisov; Moscow, Izvestiya, 30 Oct 59, p 12)

I. S. Shklovskiy, Doctor of Physicomathematical Sciences, the noted Soviet radio astronomer, interviewed on the prospects of using the new Soviet radiotelescopes, said:

"Radioastronomy has already enriched science concerning the universe by a number of discoveries of the foremost importance. A peculiarity of a radioastronomical investigation of the Moon is that it presents possibility of investigating, not only its surface layers, but also its subsurface layers. The new radiotelescope also opens the possibility of studying different regions of the lunar surface, whereas earlier it was possible to obtain only averaged data.

"Observations of radio emissions from Venus, which is always covered by a dense layer of clouds, are of great interest. It is possible that such investigations will permit the acquiring of data on Venus' period of rotation around its axis for the first time.

"Radio images of the Sun, which are being systematically obtained, are of great practical value because the interconnection of processes in the active regions of the Sun and certain, up till now, very puzzling geophysical phenomena have been successfully defined more accurately.

"Great prospects have been opened to science as a result of investigations of sources of radio emission which occur far beyond the limits of the solar system. Of exceptional interest, also, are the gas nebulae, formed as a result of the explosions of the so-called supernovae.

"In recent years, the sensitivity of receiving apparatus in the decimeter and centimeter ranges has sharply increased. Inasmuch as the new radiotelescope operates exactly in this range, it will have an irrefutable advantage over even the largest foreign radiotelescopes which operate in the meter range, since its resolving power is considerably higher.

"When the Soviet cross-shaped radiotelescope (the largest in the world,) operating on meter waves, goes into operation, it will be possible to study the enormous quantity of sources of radioemission located far beyond the limits of our Galaxy. It 'penetrating' capability will be

incomparably greater than that of the most powerful optical telescope in the world, with a mirror diameter of 5 meters, which is located on Mount Palomar in California (US).

"The results of the new investigations will give the most valuable information on the nature of the great universe and, together with the data on optical astronomy, will serve as the basis for all cosmological theories." ("Still Another Boundary"; Moscow, Izvestiya, 30 Oct 59, p 12)

Auroral Observations in the Ukraine

Visual observations of aurorae by the network of hydrometeorological stations in the Ukraine are being conducted under the IGY program by 16 stations. However, reports also enter from other stations.

Aurorae are reported to have been noted nine times in 1957: 21-22 January; 1 July; 4-5, 22, 29-30 September; 19, 20-21, and 31 October. In 1958, aurorae were noted on 11 February, 14 May, 8-9 July, and 4-5 September. The last three aurorae were recorded by the magnetic station of the Academy of Sciences Ukranian SSR in Demidov (near Kiev), which began operations in the spring of 1958. Aurorae were observed in different regions, among which were Crimea, Odessa, and other southern regions.

A high coincidence was noted between the times of the aurorae and the most active magnetic storms. There were also magnetic storms, however, in cases in which aurorae could not be seen by observers. This could have been connected with the low brightness of the aurorae or with overcast. But in a number of cases, the magnetic storms, in general, were not accompanied by aurorae. ("Observations of Aurorae in the Ukraine," by L. Z. Prokh and L. N. Yaremenko; Moscow, Meteorologyya i Gidrologiya, No 10, Oct 59, p 31)

New Astrophysics Laboratory Completed at Pulkovo

The completion of a new astrophysics laboratory in the compound of the Main Astronomical Observatory at Pulkovo has been reported. The installation is intended for making detailed studies of the solar spectrum.

An optical tunnel, claimed to be the longest in the world, 120 meters, is located in the basement of the new laboratory building. A steel tube, 1/2 meter in diameter, is mounted in the tunnel. Mirrors fastened at the ends of the tube reflect the Sun's rays, and on a 6-meter arc, spectra of different wave lengths of light are formed. ("Astrophysical Laboratory in Pulkovo"; Moscow, Izvestiya, 4 Nov 59, p 6)

Hungarian Astronomers Observe Comet

Workers at the astronomical institute of the Hungarian Academy of Sciences and at the Urania Observatory have been watching the Fiacobiui-Zinner Comet for several days. The comet was discovered in 1900; it cannot be seen by the naked eye. Both observatories are observing its brilliance, and photographs have been made of it at the Szabadsag Mountain Observatory of the academy. Its greatest brilliance will come in November, when it will approach within 50 million kilometers of Earth. This is the second comet which has been observed this year. Those interested can see the comet through the telescopes of the Urania observatory. ("Hungarian Astronomers Observe Comet"; Budapest; Nepszabadsag, 2 Oct 59, p 6)

IV. METEOROLOGY

Anticyclone Fronts

In the initial state of development of an anticyclone, when it is found in a --generally cold-- homogeneous air mass, in the free atmosphere above it, there is a considerable horizontal temperature contrast, often persisting to the limits of the entire troposphere. A curved frontal surface extends upward over the anticyclone. During the formation of the anticyclone, a temperature heterogeneity prevails in the upper layers. The vertical thickness of the cold air in it decreases considerably as a result of heat advection and descending motion. This is accompanied by a deformation of the frontal surface, represented by a reduction of the angle of inclination and a transition into the horizontal plane.

Beginning with the early state of formation, in the anticyclone and above it, there are thick, stable layers 3,000-4,000 meters thick, representing transitional zones of the high fronts (in the territory of European USSR). As the formation of the anticyclone progresses, the vertical thickness of the stable layers in it decreases, but, at the same time, the thickness of the inversion layer increases, starting, generally, with the layer at the Earth's surface. This, evidently, explains the shrinking of the entire stable layer. ("Frontal Structure of Anticyclones," by O. P. Petrenchuk; Leningrad, Trudy Glavnoy Geofizicheskoy Observatorii, No 82, 1958, pp 45-67)

Characteristics of Convective Cloud Streams

An earlier work by the author (Trudy GGO, No 72, 1957) gave approximate formulas for the calculation of the temperature field, humidity, and velocity in a stationary convective stream in the atmosphere below the condensation level, as well as formuals for determining the height of the condensation level.

This work considers that part of the stream which is above the condensation level. It is assumed that, when there is a secondary turbulent exchange with an unsaturated surrounding medium, the rising of air within the stream above the condensation level may be accompanied, not only by a condensation of water vapor, but also by an evaporation of droplets which extends to the periphery of the flow as long as the process of turbulent mixing is sustained. It is impossible to predict whether the rate of evaporation is sufficiently rapid to maintain the condition of saturation. Furthermore, if the droplets which are carried toward the periphery of the flow evaporate before reaching the limits of the stream, the cloud boundaries will not coincide with those of the convective flow. The existence of saturated and unsaturated zones makes a rigorous solution, in the general sense, of the problem of a cloud stream extremely difficult.

The article deals with the simplest, although sufficiently abstract, case in which there is a relative humidity of 100 percent in the surrounding medium above the condensation level. Under these conditions, the unsaturated zone will be absent. ("Calculation of the Characteristics of a Convective Cloud Stream," by I. V. Vasil'chenko; Leningrad, Trudy Glavnoy Geofizicheskoy Observatorii, No 82, 1958, pp 22-25)

V. GRAVIMETRY

Gravimetric Program in China

This paper states that China's State Bureau of Geodesy and Cartography has launched extensive gravimetric activities in China according to the program proposed by V. V. Brovar and others, which was presented in the Volume 2, No 4, 1958, issue of Ts'e-liang Chih-t'u Hsueh-pao. It was found that the above-mentioned program needed improvement and extension. The paper presents refinements of that program as suggested by unidentified persons working on the gravimetric project.

The paper also states that China, as yet, does not have an economical and rational plan for taking gravity measurements of mountainous regions and presents two programs which the authors derived from Soviet data.

In working out the formuals used in the program, they reportedly received help from the Gravity Division (重力組) of the Institute of Geodesy and Cartography, Academia Sinica, which institute is directed by Fang Chun (方俊).

("On Programming Gravity Measurement in China," by the Department of Astrogravimetry, Wuhan Geodetic and Cartographic College [武漢測繪學院; Peiping, Ts'e-liang Chih-t'u Hsueh-pao (Acta Geodetica et Cartographica Sinica), Vol 3, No 3, Aug 59)

Development of Leveling Networks in China According to a Standard System

A method of developing a leveling network using a standard altitude is given. Since the All-China gravimetric survey is still uncompleted, test calculations were made using a small quantity of gravimetric data and considering Bouguer anomalies in the region of the survey as equal to zero. An evaluation of and a suggestion for a gravimetric survey in China for leveling are given. ("Development of Leveling Networks According to a Standard System," by Kuan Tse-lin; Peiping, Acta Geodetica et Cartographica Sinica, Vol 2, No 4, 1958, pp 263-273)

VI. OCEANOGRAPHY

New Hydrostat Built by USSR Ready for Testing

Preparations for underwater explorations and experiments with a new hydrostat developed in the USSR are now under way. The craft, resembling an oversize artillery shell, is designed for submarine investigations in the sea at depths down to 600 meters. It will be lowered and raised by means of a steel cable.

The hydrostat is of alloyed steel construction. Portholes made of especially strong organic glass will enable studies of submarine flora and fauna to be made by a scientist in complete safety. In essence, it is a small laboratory. Electric power and telephone communication are supplied from the surface ship.

According to the report, the hydrostat was built in the Baltic Plant in Leningrad. ("Submarine Prospector"; Sovetskaya Latviya, 6 Sep 59)

Night Wave Studies at Yalta Marine Hydrometeorological Station

Night observations of wave disturbances were organized in two points of the sea by the Marine Hydrometeorological Station at Yalta. Using wavemeter-perspectometers fixed at heights of 10 and 40 meters above sea level, observations of buoys illuminated by searchlights were conducted. The buoys were located at distances of 300 and 740 meters, respectively, from the instruments. The searchlight was mounted on a stand, fastened firmly to the floor of the instrument shack, in front of a window cut in the front wall and below the level of the wavemeter apparatus.

The searchlight can be rotated vertically and horizontally. Its one kilowatt bulb is mounted vertically.

The observations determine the type and form of wave disturbance and the direction of propagation of the waves, their height, and periods. The length and speed of a wave can be successfully determined only during heavy seas.

The station conducts special observations on the development and abatement of a storm. The frequency of observations is selected so that the progress of the change of wind and wave elements with time can be graphically expressed with sufficient accuracy. Observations on the development of wave disturbance usually begin with a wave height of 0.5 meter and are accompanied by measurements of the speed and direction of the wind. ("Observations on Wave Elements at Night," by A. S. Balanin; Moscow, Meteorologiya i Gidrologiya, No 10, Oct 59, p 34)

Installation of Tide Gauge on Mud'yug Island

A tide gauge was recently reported installed on the island of Mud'yug by the Northern Administration of the Hydrometeorological Service. For installing the instrument, it was necessary to construct a vertical shaft about 3 meters deep and to lay about 20 meters of horizontal pipe. To avoid shifting, the horizontal pipe, which consisted of 20-centimeter diameter, cast iron sewer pipe, was laid 60-70 centimeters below the "mull" of the station. The bottom of the vertical shaft was dug 0.5 meter below the level of the pipe.

Because of the nature of the sandy soil, divers, using a hydraulic jet and also a fire pump, were able to wash out the pipe trench and shaft to the necessary depth. Predriven piling was used to form the sides of the trench and shaft. ("Experience of Erecting a Tide Gauge in Sandy Ground," by I. G. Kron; Moscow, Meteorologiya i Gidrologiya, No 10, Oct 59, pp 34-35)

VII. ARCTIC AND ANTARCTIC

Operation of Severnyy Polyus-8

The drift station Severnyy Polyus-8 has been operating for 5 1/2 months, since April 1959. During that period, the station staff has been conducting a great amount of complex scientific research for the study of the Arctic. The ice floe has traveled a zigzag course, covering a total distance of about 1,200 kilometers. On a straight line, the distance from the starting point has been slightly over 430 kilometers.

According to a radio report received on 8 October, the station Severnyy Polyus-8 was then at 78 28 N and 181 52 E. That is about 770 kilometers north of Ostrov Vrangelya.

A transport plane was sent to Severnyy Polyus-8 on October 8 to deliver new scientific equipment, various other materials, food supplies, mail, packages, and motion-picture films. The plane flew from Moscow, via Arkhangel'sk, Dikson, Tiksi, and Chukchee Peninsula, to Ostrov Vrangelya and, from there, to the drift station. Several flights to the ice floe were to be made from coastal bases. ("On an Ice Floe Across the Ocean"; Moscow, Vechernyaya Moskva, 8 Oct 59)

Antarctic Research Under IGC Program

The Fourth Soviet Antarctic Expedition has been operating under the IGC program for the past 9 months. During this period, a large amount of material has been collected by the scientific teams and stations. Many observations are of great theoretical and practical value.

During the last few months, most of the work was done by the glaciological, aviation, and transport teams and by workers of the mechanical workshop.

The aviation team has begun flights to support the work of various scientific teams. A group of glaciologists flew to Drygalski Island. Ice reconnaissance was conducted in the coastal zone, and the edge of the floating ice along the Mirnyy meridian was investigated. Several night flights were made with groups of actinometrists. A 1,000-kilometer zone of Davis Sea between the West Ice Shelf and the eastern part of Shackleton Ice Shelf were studied from the air. Landings were made on the shore ice for the purpose of magnetic and gravimetric observations. In the next few days, flights will begin for a topographic survey of East Antarctica.

Soviet glaciologists have completed stationary observations in the area of Mirnyy and its surroundings. The glaciologists recently conducted laboratory research on a gigantic block of continental ice which had split off. The results of these studies indicate some interesting characteristics of continental ice formation. The glaciological team will soon start to work in the area of station Vostok. Fifty-meter holes have been drilled for this purpose in the ice sheet. The scientists wintering at station Vostok have been conducting experimental work in preparation for even deeper test holes.

In addition to conducting observations, scientists of many teams are working on the improvement of their instruments. The serometeorologists have designed and constructed an original "blizzard meter" [metelemer]. The radio-anemometers established on the shore ice make it possible to determine, with mathematical accuracy, the zone of influence of the winds continuously blowing off the continent towards the sea.

As in the case of previous expeditions, members of the Fourth Antarctic Expedition are expanding their ties with foreign stations in Antarctica and exchanging materials of observations and scientific information. -- A. Dralkin, Chief of Fourth Antarctic Expedition ("Spring Is Here"; Leningradskaya Pravda, 9 Oct 59)

Fifth Antarctic Expedition Soon to Leave

Only a short time remains before the departure of the Soviet expeditionary ship Ob' for Antarctica. From Leningrad, the ship will sail to Queen Maud Land and then along the coast of Antarctica to Mirnyy. Then, the ship will head for Bellingshausen Sea, one of the least explored regions of the Antarctic.

Soviet polar scientists will conduct complex scientific research in this area. Over 20 scientific associates of various specialties will take part in the work. Most of them are employed by the Arctic and Antarctic Institute of the Ministry of Maritime Fleet. The marine detachment of the Fifth Antarctic Expedition is headed by Prof I. V. Maksimov. The Ob' will be under the command of Captain A. I. Dubinin.

The Ob' has now completed its voyage from the Arctic to the Baltic. In the next few days, the vessel will arrive in the Leningrad port where the loading of expeditionary equipment will begin. ("Leaving Soon"; Moscow, Vodnyy Transport, 24 Oct 59)

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